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Environmental Protection Agency, Denver, Colo Region VIII

1977

PB 272 863

DRAFT SUMMARY

DENVER REGIONAL ENVIRONMENTAL IMPACT STATEMENT FOR WASTEWATER FACILITIES AND THE CLEAN WATER PROGRAM

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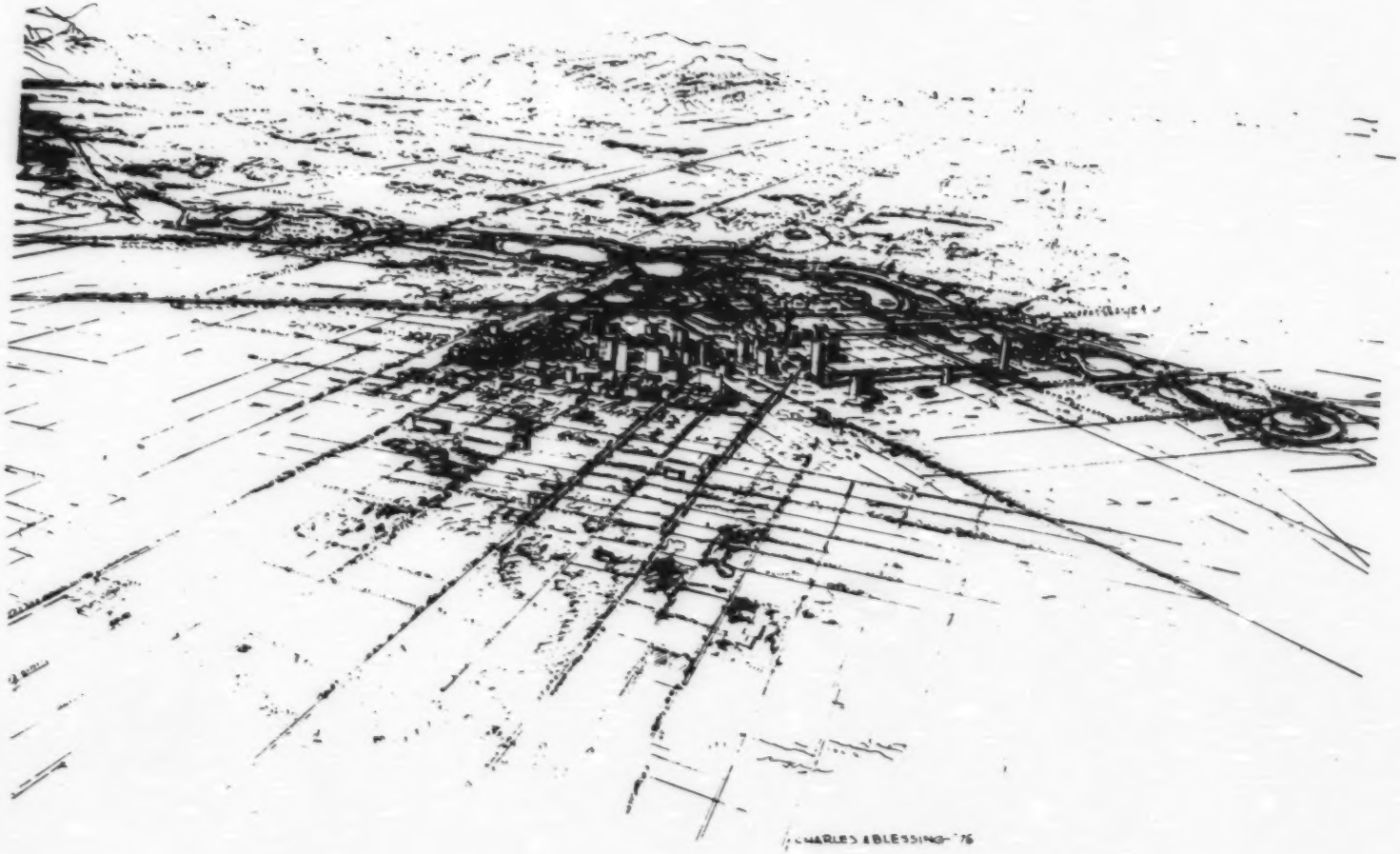
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DRAFT SUMMARY
OF THE
DENVER REGIONAL ENVIRONMENTAL IMPACT STATEMENT
FOR
WASTEWATER FACILITIES
AND THE
CLEAN WATER PROGRAM

BACKGROUND

A law of far-reaching significance for Federal Agencies was passed by Congress in 1969. This law, called the National Environmental Policy Act (and referred to as NEPA), required a Federal agency to take account of, and make known, the environmental impacts of any major action it is about to undertake. The agency must decide whether a given action is a major one that will have significant effect on the environment. The document that a Federal agency must prepare on such a major action is called an Environment Impact Statement (EIS).

The Environmental Protection Agency (EPA) is responsible for seeing to it that many of the environmental laws passed by Congress are put into effect; however, it is also one among many Federal Agencies which must also comply with NEPA.

In 1972, EPA became responsible for implementing the Water Pollution Control Act Amendments (P.L. 92-500). This law among other things established water quality goals for U.S. waters and streams:

1. "...wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by July, 1983," and

2. ...that the discharge of pollutants into navigable waters be eliminated by 1985."

The law set up a comprehensive planning process involving EPA and the states to define the necessary stream water quality standards, the treatment levels of discharges to achieve these goals, and how the goals would be attained. The law created the National Pollutant Discharge Elimination System (NPDES) of permits to regulate and control discharges to the Nation's streams. Congress also set aside

$18 billion in grant funds to pay 75% of the eligible costs of publicly owned waste treatment works to assist municipalities in achieving the necessary plant effluent quality to meet the water quality goals.

The Environmental Protection Agency is charged with overseeing most of these and other provisions of the Act. Two areas of EPA responsibility under the Act are brought together in this EIS effort.

Section 201 of the Act provides for a three-step approach, paid for mostly by federal money, for the planning, design, and construction of municipal wastewater treatment works. Step I involves the development of a "facilities plan" that evaluates treatment needs, systems capacities, alternatives, and develops a preliminary design for the project. EPA is charged with review and approval of such Step I plans before design (Step II) and construction (Step III) funds can be obtained. An integral part of the EPA's review involves an assessment of environmental impact of facility plan recommendations.

Section 208 of the Act is also administered by EPA. This is a special planning function that analyzes complicated water pollution problems on a regional or statewide scale. Where the Governor of a state identifies a major water pollution problem, a 208 agency is designated to develop this comprehensive planning approach to the problem. 208 planning involves defining sources of water pollution, treatment needs and priorities, a close evaluation of stream uses, and the necessary controls and the type of management needed to achieve the goals of the Act. Such a plan in effect will set many of the criteria to be met in individual 201 facilities plans for the study area.

THE NEED FOR THIS EIS

EPA's policy in the past has been to evaluate wastewater treatment facility plans in the Denver metropolitan area on a project-by-project basis and to prepare individual project environmental impact statements, if necessary. The anlaysis of regional issues and secondary impact questions has been difficult using a project-by-project approach. EPA acknowledges this difficulty in the final EIS for the present plant expansion by the Metropolitan Denver Sewage Disposal District No. 1 (February, 1974), in the final EIS for the Englewood-Littlewood sewage treatment plant (August, 1974) and in the negative declaration for the South Platte II interceptor sewer (September, 1975), where EPA indicated the intention to prepare a regional environmental impact statement addressing these broader issues.

Presently there are eight wastewater treatment and collection facility plans in preparation by various municipalities and sanitation districts throughout the Denver metropolitan area. Each of these wastewater treatment facility plans must identify the most cost-effective and environmentally sound alternative after considering the local and regional implications of the project. Additionally, the Denver Regional Council of Governments has prepared a draft 208 Plan named the Clean Water Plan, which evaluates the longer term problems and alternatives to meeting the water quality goals. Considered together, these projects and the Clean Water Program raise significant regional issues which must be addressed, such as population levels and distribution, air quality, conversion of agricultural land, protection of environmentally sensitive areas, point and non-point pollution control, wastewater reuse, etc.

There has been a great deal of discussion over the last two years between citizen groups and various levels of government concerning the best way to address these regional issues. A regional environmental "Carrying Capacity" study was suggested by the Denver League of Women Voters and the Colorado Open Space Council in May of 1975 as one possible way to evaluate the issues involving growth. This suggested "Carrying Capacity" study would have involved not only the actions of EPA but also consideration of significant regional actions by other Federal agencies.

As a result of EPA's concerns as well as the suggestion of these two civic groups, a Regional Environmental Impact Statement has been prepared which analyzes various regional issues associated with the wastewater facility plans and the 208 Plan. It is expected that this Regional Environmental Impact Statement will expedite Federal funding in the longer term and substantially reduce the need for Environmental Impact Statements on a project-by-project

basis. More importantly, the approach will permit local governments and the citizenry to address these significant regional issues.

As an overall perspective, the following general objectives were identified for this EIS based on the above discussion:

(a) To define and assess the environmental impacts of the eight Denver metropolitan Wastewater facility plans and the secondary impacts of the 208 Clean Water Program.

(b) To define EPA policy and decision options for assuring consistency between EPA's Air and Water Programs and the goals of NEPA.

(c) To stimulate public discussion about "desirable" environmental goals for the Denver metropolitan area, with emphasis on the relationship of EPA's construction grants program for wastewater treatment facilities to other Federal, State, Regional and local governmental programs.

The latter point deserves some further elaboration. EPA has coordinated the preparation of this EIS with various state, local and federal agencies. Some of these agencies have performed or have embarked on studies which are pertinent to this EIS and the issues it addresses. For example, this EIS makes extensive use of information, data, and analysis developed by the Denver Regional Council of Governments and its consultants for the 208 planning effort. The U.S. Department of Housing and Urban Development has initiated an EIS on its FHA housing program for Denver, and the U.S. Bureau of Land Management will soon complete a revision to its draft EIS on the proposed Foothills Water Treatment Plant.

EPA must make a series of decisions about the most effective way to spend resources (grant funds). These resources, though large, are limited. EPA has several options concerning the level of treatment of wastewater, which pollutant discharges are most important, what wastewater treatment plant flow capacities are most appropriate, what standards are appropriate to meet water-use goals and others. The environmental consequences of these options are an integral part of the draft Environmental Impact Statement. These actual and anticipated proposals have been organized into three broad alternative strategies or courses of action which EPA may take. Subsequent discussions in this draft EIS plus public review and input may modify and evolve one of those alternative strategies into a course of action best suited for the maintenance and enhancement of the environment. Thus, the draft EIS, together with the public review and input it will stimulate, will form the basis for a final EIS which will address the environmental effects of EPA proposed actions.

ACTIONS UNDER CONSIDERATION IN THIS EIS

The 201 Facility Plans

Various local agencies have prepared or are developing facility plans to construct, improve and/or expand municipal wastewater collection and treatment systems for the following planning areas (see Figure 1):

1. South Adams County
2. Englewood and Littleton
3. South Lakewood
4. Cherry Creek and Goldsmith Gulch
5. Lower South Platte
6. Clear Creek and Sand Creek
7. Westminster and Broomfield
8. Metropolitan Denver Sewage Disposal District No. 1.

In order to address these regional issues, EPA grouped 201 facility plan alternatives into three broad alternative strategies termed Local, Regional and No-Action. These are described in Table 1. The Local alternative basically involves upgrading existing subregional or local wastewater treatment plants plus the construction of three additional satellite plants. This alternative is nearly identical to the recommendations of the Clean Water Plan developed by the Denver Regional Council of Governments under Section 208 of Public Law 92-500. The Regional alternative in most cases involves the collection of all wastewater for treatment at the Denver Northside and/or Metropolitan Denver Sewage Disposal District No. 1 Plant. Figure 2 illustrates the basic concepts of satellite plant and regional approaches. The No-Action alternative closely resembles the Local alternative, and represents what could happen if EPA decides not to provide grant funds for design and consturction of wastewater facilities.

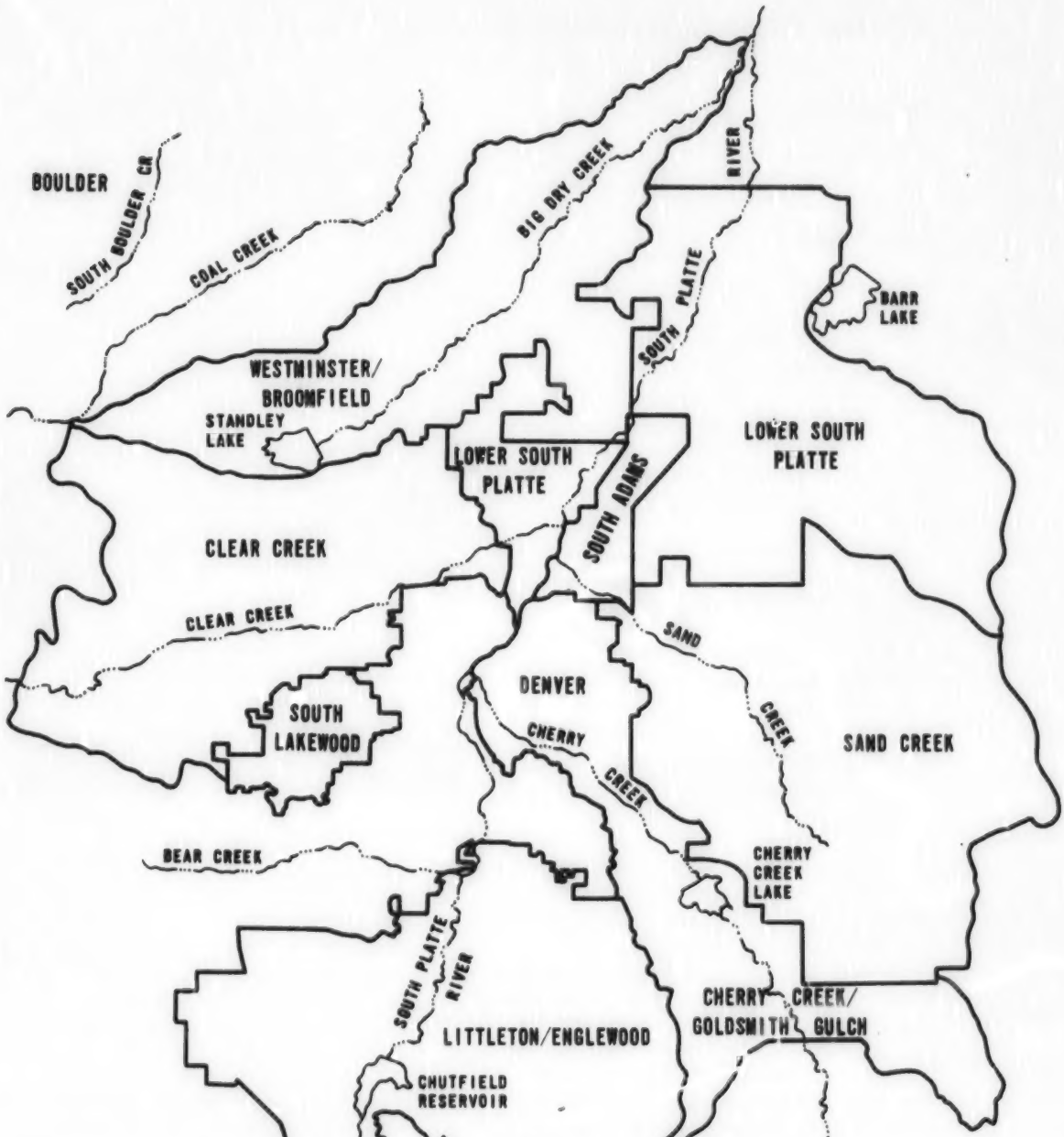
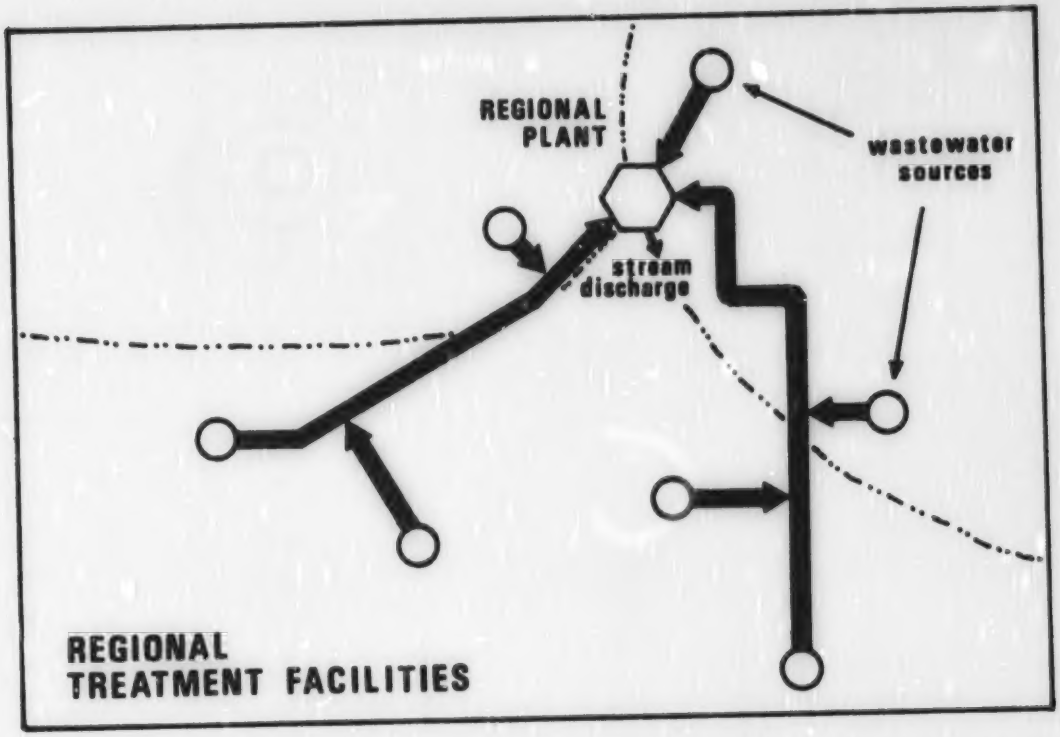


FIGURE 1
PLANNING AREAS FOR
WASTEWATER FACILITIES

TABLE I

SUMMARY OF 201 ALTERNATIVES

Service area			
South Adams	Maintain existing plant, add 1.25 mgd without nitrification 1978, 2.5 mgd nitrification in 1983, and final 1.25 capacity addition with nitrification in 1986 for a total capacity of 5 mgd.	Add 1.25 mgd activated sludge capacity in 1977, abandon plant in 1985, all flows to MDSDD #1.	Add 1.25 mgd activated sludge and 5 mgd dispersed floc nitrification capacity 1978, final 1.25 mgd activated sludge added in 1986.
Englewood/Littleton	Addition of ammonia and chlorine removal for 20 mgd capacity by 1979. Further expansion of joint plant to total capacity with AWT to 38 mgd in 1983.	Same as local alternative except flows over 20 mgd transported to MDSSD #1.	Addition of ammonia and chlorine removal delayed till 1980. Ultimate expansion to 38 mgd delayed to 1986.
South Lakewood	Enlarge existing plant, construct AWT and improved sludge handling facilities; capacity expanded from 2 mgd to 5-6 mgd. Some effluent reuse.	Abandon existing plant and transport all flows to Northside/MDSSD # 1 complex.	Maintain existing plant, and service area, transport effluent to Northside/MDSDD # 1 complex.
Cherry Creek/ Goldsmith Gulch	System of interceptors to expected 1985 flow from upper Cherry Creek to Northside/MDSDD #1 complex. Provision for AWT satellite plant in 1985.	Same as local alternative except additional interceptors added in 1985 in lieu of AWT Cherry Creek satellite plant.	Same as local alternative except construction of interceptors delayed two years, plans for satellite plant abandoned.
Lower South Platte	New plant for flows from Brighton, lower Thornton, 1st, 2nd and 3rd creeks. Remainder of area flows to MDSDD #1 and South Adams County Water and Sanitary District.	All flows transported to MDSDD # 1.	Same as local alternative except delayed four years.
Clear/Sand creeks	New plant with 6.5 mgd capacity in 1983 on Clear Creek. AWT for reuse. Additional flows to MDSDD #1.	Parallel Clear Creek interceptor to transport all basin flow to MDSDD #1 for treatment.	Same as regional alternative except delayed three years.
	New plant at existing Aurora plant site for 30-40 mgd with reuse. Remainder of flows to MDSDD #1.	Parallel Sand Creek interceptor to transport flow from entire basin to MDSDD #1. Abandon existing Aurora plant.	Same as regional alternative except delayed three years.
Bloomfield/ Westminster	Expansion of existing Big Dry Creek plant to 8 mgd by 1985 with land application/agriculture reuse.	Maintain existing plants with excess flow to MDSDD #1.	Expansion of existing Big Dry Creek plant to 5 mgd, expansion of Bloomfield plant by 3 mgd lower Thornton to MDSDD #1.
MDSDD #1	Addition of ammonia removal for total plant capacity of 190 mgd by 1983. Optim for reuse.	Plant expansion with ammonia removal for total capacity by 1990 of 260-270 mgd.	Addition of ammonia removal facilities delayed until 1985.


REGIONAL
PLANT
wastewater
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discharge
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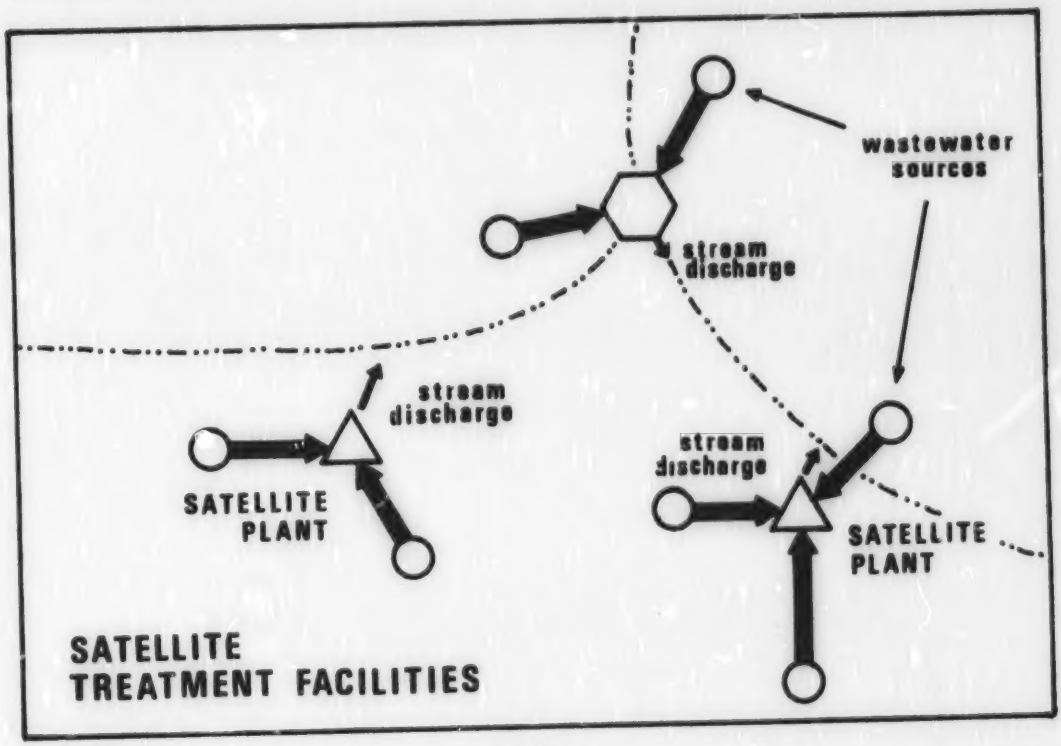
TREATMENT FACILITIES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TREATMENT FACILITIES

FIGURE 2

The Clean Water Program (208 Plan)

The Denver Regional Council of Governments (DRCOG) was designated the 208 study agency for the Denver area to address the complicated water pollution problems in this highly urbanized area.

The DRCOG 208 study, named the Clean Water Program, has evaluated the national goals and their attainability in the Denver area with respect to financial, environmental, social and economic impacts. It has also attempted to determine technical solutions to regional environmental problems and recommended a management system for implementing the Clean Water Plan. The draft of the 208 plan was released in April by DRCOG. The final plan is expected to be submitted to the Governor for review in July, 1977.

As an integral part of the work effort of the 208 plan, population allocations and a land-use plan have been developed by DRCOG, as well as a set of recommended treatment plant funding priorities and levels of quality for plant effluents. An assessment of the non-point source problem, mainly from stormwater and snowmelt runoff as it affects meeting the national goals, is also included in the plan.

The recommendations of the Clean Water Plan for reducing pollution from non-point sources primarily involve reducing or removing the deposit of pollutants on land, paved areas, and other impervious areas so they won't be washed off into streams. This can be accomplished to some degree by such methods as improving the effectiveness of street sweeping, reducing the use of deicing chemicals, and regulating use of lawn and crop fertilizers. The collection, storage, and treatment of stormwater runoff was found by the DRCOG to be too expensive for the improvement possible in stream water quality. It was also recommended that an intense stream water quality monitoring program be instituted to better identify non-point sources of pollution and formulate more specific control methods.

ENVIRONMENTAL IMPACTS

Wastewater collection and treatment is one of several basic services local government provides to serve the needs of its citizens. Planning to accommodate future population and its need for wastewater treatment and disposal is a prudent and responsible function exercised by local governments. Construction and operation of these facilities in accordance with plans to accommodate future growth must be considered a contributing factor to the environmental consequences of future growth. The same is true for other services such as highways, schools, and water supply. On a regional basis, it is rare that the provision or lack of a single "municipal" service stimulates or constrains regional growth, and can be considered the dominant factor in growth-related environmental impacts. The provision of a single municipal service can, however, influence development patterns and the rate of development.

The EPA must decide what role, if any, it should play in supporting future growth towards the attainment of regional goals, and the related environmental effects. Thus, it is most logical to first address the changes expected to occur in the region as a result of the population increases and resultant development patterns projected for the year 2000 for which the facility plans and the Clean Water Plan were developed.

Growth

About 60 percent of the jobs and population in Colorado are in the Denver region. From 1940-1970, employment grew at an annual rate of 3.7 percent per year, more than twice the annual rate for the nation as a whole. During the 1960's, the Denver region population grew between 3 and 4.6 percent a year, considerably higher than the 2.3 percent for the state as a whole. From 1970 to 1975, the population growth rate was 3.7 percent a year to a total population of about 1,474,000. The City of Denver has 56 percent of the jobs in the region, but only 36 percent of the region's population. Denver continues to lose population to suburban cities and counties, and Adams, Arapahoe, and Jefferson counties have been getting the lion's share of people moving to the region from elsewhere.

The amount of urbanized land has increased, along with population and employment, until about 234,000 acres of land in the Denver region is urbanized. There is enough vacant land zoned for urban uses to support a population of about 6,000,000. The overall picture these and other statistics paint is, by now, an all too familiar one. Decay of the urban core, in this case the City of Denver, flight of the affluent and advantaged to the suburbs, and containment in and

movement to the urban core of the young, old, poor and disadvantaged. The forecasts of the future indicate a continuation of this trend.

Regional forecasts of future growth have been prepared by the Denver Regional Council of Governments (DRCOG). A brief summary is given in Table 2. The population growth rate from 1975 to 1985 is forecast to be 2 percent, and 1.8 percent from 1985 to 2000. The largest increases in population and employment will occur in Jefferson and Arapahoe counties. Denver's share of regional employment will drop from 56 to 45 percent, and its share of regional population will drop from 36 to 28 percent, although in absolute numbers employment and population in Denver will increase 38 and 21 percent respectively. Residential density in the region will increase somewhat, but generally, urban sprawl is expected to continue. Recreational opportunities within the region will decrease as the park density data from Table 2 indicates. This will increase the intensity of use of available recreation areas within and without the region resulting in overuse and damage. The recreational value of the region's streams will become increasingly important with increased demand for recreational opportunities and development of streamside parks.

Municipal dependence on property tax revenues promotes competition for new industry and aids in the dispersal of economic activity throughout the region. Industry itself many times prefers to locate in suburban areas because of lower taxes and land prices, corporate image and generally more lenient development controls. As there are few inducements, either fiscal, economic or legal, resisting these pressures, the DRCOG forecasts of future economic activity and consequent ponulation and land use changes appear valid given all that is now known. New pressures may appear or intensify in the future to change these forecasts; however, such speculations must for the present be discounted.

Table 2. Growth in Employment, Population, and Land Use (1975 - 2000)

Growth Sector	1975	1980	1985	2000	Percent Change 1975-2000
Employment (000's)	668.1	763.1	848.7	1,130.5	+69%
Population (000's)	1,473.8	1,650.2	1,802.5	2,350.0	+60%
Urbanized Land (000's of acres)	234.0	-	-	292.0	+25%
Residential Land (000's of acres)	82.0	-	-	118.8	+45%
Residential Density (people/acre)	18.0	-	-	19.8	+10%
Park Density (acres/capita)	15.2	-	-	9.8	-36%

Water

Current water quality in the South Platte River and its tributaries is generally poor. Relatively good water quality is found in streams' headwaters at the fringes of the urbanized Denver region, but water quality deteriorates as the streams flow through the urban area. By the time the South Platte reaches Henderson downstream of Denver, water quality closely resembles the treated discharge from a sewage treatment plant. The alternative strategies evaluated in the EIS all result in improved water quality by 1983, but the goals established for water quality are not met.

Municipal wastewater treatment plants are the most important point sources. They are most important for their contributions of BOD, ammonia, and phosphate during late fall and winter when the flow in the streams is low and there is not much dilution. Biological oxygen demand (BOD) refers to the amount of organic material which is available as food for various micro-organisms. When a large amount of food is available, the number of micro-organisms increase and the amount of oxygen in the water is reduced. Ammonia is toxic to fish. Nitrogen and phosporous compounds supply nutrients to small water-borne plantlike organisms. Algal blooms may occur and cause unpleasant odors and unsightliness. Also, when these organisms die and decay, they represent a BOD. However, in some cases, notably on Clear, Sand, and Cherry Creeks, flows from wastewater treatment plants make up a significant amount of the total flow periods. The most dramatic example of this situation is the South Platte downstream from the Metro (MDSDD No. 1) wastewater treatment plant. The Metro discharge amounts to 60-70 percent of the total flow in the South Platte during winter, and about 40 percent the rest of the year. Thus, it can be seen that the water quality of the Metro discharge to a large extent dictates water quality in the South Platte river downstream from Denver.

This example also demonstrates some of the advantages and disadvantages of various ideas to reuse wastewater treatment plant discharge for urban and agricultural irrigation. If the Metro discharge, or a large part of it, were diverted to irrigation canals, water quality in the South Platte would be improved. This does in fact now occur to a limited extent in that 14 percent, or about 6.5 million gallons a year, of the Metro discharge is diverted to the Burlington Ditch.

The disadvantage of diverting the Metro discharge is that downstream flow in the South Platte is reduced. On some of the other streams of the area, the flow remaining in the stream if treatment plant discharges were eliminated wouldn't be enough to support water life such as fish year round. Another advantage is that diversions of plant discharges for irrigation might be exchanged for additional diversion of water upstream for municipal use, thus increasing the Denver region's domestic water supply. These exchanges, of course, would have to be accomplished in accordance with Colorado's water rights laws. Such exchange agreements have been negotiated by the Denver Water Board and the cities of Northglenn and Westminster. Unrestricted use of wastewater treatment plant discharges for irrigation of agricultural crops, particularly crops for human consumption, is not generally allowed in this country because of public health concerns. Damage to agricultural soils may also occur under certain circumstances. However, this practice is common in Europe.

One final advantage is that currently it is assumed that the quality of discharge waters doesn't have to be as good if the water is used for irrigation, compared to the quality required for discharge to a stream. Thus treatment costs would be reduced. However, much of this advantage may be lost if irrigation water quality needs to be regulated in order to protect public health and the agricultural soils of the region. In any case, reuse of wastewater treatment plant discharge would only occur during the irrigation season and would not alleviate stream water quality problems at the time of the year when they are generally the worst, late fall, winter and early spring.

If additional and improved municipal wastewater treatment is provided, water quality problems in the future will be caused primarily by non-point sources of pollutants, a consequence of urban growth. There are a few exceptions to this general statement where municipal wastewater treatment plants would be more important for a few pollutants at certain times of the year. However, this dominance by non-point sources is the basic reason why future water quality goals will not be met if the proposed municipal wastewater treatment plant improvements are made.

Air

Standards have been established for five air pollutants which affect human health. Of those five pollutant standards, three are exceeded in the Denver region. These three are the standards for ozone, carbon monoxide, and particulates.

The largest cause by far, of the ozone and carbon monoxide air quality problems in the Denver region are emission of pollutants by vehicles. Thus, future growth and patterns of growth have long been believed to be important to Denver's future air quality because these factors influence the amount of automobile usage in terms of vehicle miles traveled per day. Thus, transportation controls, and possibly growth and land use restrictions, were considered potentially necessary to help meet national air quality standards. Because of the importance of these issues, a detailed computer analysis was used to forecast future air quality. The results basically demonstrate that with the expected success of the Federal vehicle Emission Control Program, future ozone and carbon monoxide air quality concentrations will improve, but not enough to completely overcome the effects of urban growth. Ozone levels will decrease, but standards will still be exceeded in 1985, and to a lesser extent in the year 2000. Carbon monoxide levels will also decrease, but local hot spots near heavily travelled highways, streets, and intersections will still exceed standards. Particulates will increase 40 to 70 percent depending on locations within the region. Air pollutants, particularly ozone, also affect crop productivity as well as human health. Losses in crop productivity are currently about $6,800,000 per year. This is expected to decrease, with decreasing ozone levels, to about $2,200,000 per year in 2000.

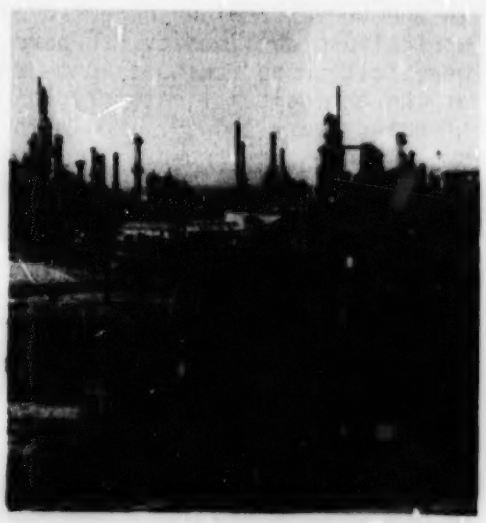
Particulates suspended in air come from a number of sources other than automobiles and smokestacks. Soil and dust arising from construction activities is a major source, but the largest source is material thrown up from paved surfaces by vehicles. Vehicles deposit particulate material on street surfaces. Street sanding, dust and dirt accumulation, and general street and tire wear also contribute. This material builds up on pavements. Eventually, most is washed off during rainstorms and becomes a non-point source of water pollution. Within several days, there is as much material on pavements as before. The interaction of tires on pavements and the air currents generated by passing vehicles throw this material into the air. The finest particles stay suspended in the air and travel long distances. The Federal vehicle emission controls therefore don't have much effect on particulate air pollution. Consequently, as the region grows and urbanizes, the particulate problem will increase.

On the whole, air quality in the Denver region will improve. That is, levels of ozone and carbon monoxide will decrease, but particulates will increase. Air quality standards will still be exceeded, even in the year 2000, but with less frequency and over smaller areas.

Energy

The 1975 population of the Denver Region constituted about 57 percent of the population of the State of Colorado. By 1985, it will constitute perhaps 60 percent, and by 2000 about 54 percent of the state population. The Denver region's share of statewide energy consumption is estimated to be on the order of 64-68 percent at the present time.

In the Denver area nearly 75 percent of all petroleum products are consumed by the transportation sector compared to 50 percent nationally. Petroleum products represent 42 percent of the total energy supply utilized in the area which is comparable to the national percentage. The industrial, residential and commercial sectors of the regional economy have nearly 60 percent of their energy needs supplied by natural gas. Natural gas supplies 41 percent of the region's total energy demand whereas natural gas supplies about 31 percent of national energy demand.



Natural gas shortfalls, amounting to 15-20 percent within five years, are expected to begin in the Denver region during 1978-79. As a consequence, shortages of natural gas may be a constraint to the growth rate by the early 1980's. The demand for natural gas by the Denver region may adversely affect the rural areas of Colorado as rural areas are dependent on liquid propane which is manufactured from natural gas. There will be an increased reliance on and demand for electric power. After 1980, if the scheduled development of power plants are delayed significantly, some brown-outs or load reduction will occur. The increased demand for electrical power will probably be met with coal-fired power plants which will necessarily increase Colorado's coal production. Consequently, beginning in the 1980's

conflicts may arise between municipal and agricultural water users in the Denver region, and energy industries over available water supplies. In the long term, increased reliance on coal-based electrical generation will force increased competition for available supplies of water which are necessary for coal mining and processing, power plant cooling, and air pollution abatement. Nevertheless, coal-based electrical generation plants will become an increasingly important source of air and water pollution. Water, being a limited resource in the area at present, will become increasing more so in the future.

Agricultural Land

In the period between 1960 and 1970, land devoted to urban uses in the Denver region increased by 12.3 percent while land devoted to agriculture declined by 6.8 percent. In all, about 33,600 acres were lost to agricultural production. Most new urban land came out of the agricultural category, and the decline in agricultural use affected every county. How much of this loss was prime agricultural land is not known.

About 134,000 acres of agricultural land in the five county Denver Region will be converted to other uses. Of that, about 38,000 acres is classed as prime agricultural land. The 134,000 acres represents 29 percent of the agricultural land in the region, whereas the 38,000 acres of prime agricultural land represents about 23 percent of the prime agricultural soils of the region. The bulk of loss of prime agricultural land would be in Adams County.

The U.S. Council on Environmental Quality has stated that "efforts should be made to assure that such farmlands are not irreversibly converted to other uses unless other national interests override the importance of preservation or otherwise outweigh the environmental benefits derived from their protection." The benefits cited include provision of open space, scenery and wildlife habitat; it is also pointed out that prime lands by their nature produce more food with less erosion and lower fertilizer and energy requirements.

The forecasted sharp declines in agricultural land use in the five county area represent only part of the likely future state of agricultural activity in the region. As the agricultural lands on the fringe of the Denver urbanized area are gradually converted to urban use, there will be increased pressure to expand and intensify agricultural activity in areas just beyond the metropolitan region. These pressures would be felt most strongly in eastern Adams and Arapahoe counties, southern Weld County and northern Douglas County. If supplies of water for agricultural use permitted, increased agricultural production in those areas would take place, with little loss in overall production despite urbanization of some cropland. However, water is a far more important constraint on agricultural activity than is land in this region, and local agricultural experts report that urbanization threatens continued agricultural activity, less because it absorbs agricultural land than because of competition with domestic water users in the allocation of water. The condemnation of water rights may make farming economically infeasible long before pressures for conversion of agricultural land are experienced.

Markets for agricultural products have not been good the last few years and farmers have had great difficulty in just breaking even. This, coupled with a drought caused intensification of competition for available water, and urbanization pressures, has sapped the basic strength of the agricultural sector of the region's economy.

Environmental Sensitive Areas

Future development and some wastewater collection and treatment faciiities will be located on floodplains of the Lower South Platte and its tributaries. Several adverse impacts will as a consequence result. Development located in floodplains will necessarily damage and/or remove riparian, stream side, habitats. Construction related soil erosion will also adversely affect aquatic life. Increased property damage from floods would occur. However, flood threats could be reduced with stream channelization and other flood protection measures which would lead to further losses of riparian habitat. The Clear, Bear, and Lower South Platte floodplains also form high wind corridors during chinook events, exposing structures and developments to wind damage. Development on foothill and upland areas will disturb the habitats and ranges of game and other species of wildlife. Increased pressures for recreation areas will lead to overuse of sites, trespassing and vandalism contributing to the degradation and loss of unique upland and riparian habitats, as well as some significant and unique geologic features of the region.

MITIGATION OF IMPACTS

The significant adverse environmental impacts just discussed are substantial and raise serious concerns about future growth in the Denver region, and EPA's role in supporting growth, by funding wastewater treatment facilities, must therefore be carefully considered. Consequently, approaches which may be taken to minimize, reduce, or eliminate impacts become important considerations in the overall decision making process.

A number of mitigation measures are evaluated in the EIS which address regional land use impacts over which EPA has little direct authority. No attempt has been made to limit evaluations of mitigations to only those which EPA has the authority to implement. This approach has been taken because of the nature of regional water quality and related problems, which have been created in a framework of overlapping jurisdictions and which must be solved to a great extent within that framework. It is necessary for EPA and other concerned parties to understand to what extent water quality and other environmental problems may be solved through EPA's direct efforts and to what extent it must rely on other governmental bodies. The results of this approach have raised or amplified issues regarding the adequacy of existing air quality, water quality and land-use regulations operating in the Denver region. This section is intended to stimulate discussion and debate by decision-making bodies, responsible agencies and the general public on desirable ways to remedy the impacts assessed in this EIS.

Mitigation of Growth Impacts

Socio-economic impacts rarely lend themselves to straightforward mitigation. Due to their complex causes and consequences, simple, short-term remedies cannot always be prescribed. Generally, less direct and more costly long-term program solutions are recommended. The overall effectiveness of mitigating programs is too variable to predict because of various limitations such as inadequate enabling authority, staffing and budgets which are too often placed on individual programs. Yet, even with adequate authority, staffing and budgets, there can be no guarantee that a given program will be effective. Some socio-economic problems simply cannot be solved by funding new program or reorganizing existing ones. Thus, the implementation of the mitigating programs mentioned below may or may not be reasonably successful in avoiding, eliminating or minimizing growth impacts. Many of these mitigations have already received consideration and study by the Denver region's governmental agencies, by the State and by the general public.

The recommendations of the Denver Metropolitan Study Panel for a Denver Metropolitan Council is the most recent example of several proposals aimed at solving many regional problems.

The following discussions on various types of mitigations present a number of steps that could be taken to improve the effectiveness of planning in the Denver region. Most listed below arose frequently in discussions with local planning officials or have been previously proposed by various governmental agencies and citizen groups over the last ten years.

Reduce the Number of Special Districts

The proliferation of special districts has created numerous problems in coordinating capital facility planning and in assuring reasonably similar levels of cost for similar levels of service throughout the region. Some of the suggestions called for the formation of a regional services agency; another was that the municipal government should assume all special service functions.

Establish a Formal Environmental Review Procedure

This might take the form of a state or regional environmental review agency, as suggested by Adams County Planning Director Robert Fleming, or it could be modeled on the environmental protection legislation of other states. Such "mini-NEPA" laws open decision-making on private and public project proposals to public review before discretionary action by local government and thereby permit citizen review of and comment on private development proposals. Environmental review procedures under the National Environmental Policy Act of 1969 (NEPA) apply only to Federal actions and actions involving federal interests.

Establish Regional Land Use Planning for Major Use and Natural Resources

The development of major types of land uses (such as large industrial establishments) could be made subject to review and approval by a regional agency which could take into consideration the locational requirements of major uses and the broad environmental concerns of the region as a whole in a manner local agencies

cannot. Empowering such an agency to review major industrial and transportation-related development decisions could help the region move toward greater integration in planning for all kinds of uses. Such an agency might be able to protect agricultural uses and environmentally sensitive areas more successfully than local governments can.

Move Toward a System of Regional Tax-Base Sharing

Reducing the fiscal rivalry which distorts both community land use patterns and industrial location decisions could be accomplished under a program of regional tax sharing. Such a system like that developed for Minneapolis/St. Paul, might begin by sharing only the increase to assessed valuation arising from new development; this initial step would be more acceptable than an across-the-board tax sharing plan, which would wipe out the fiscal advantages many communities have assiduously striven for through years of planning. However, even the sharing of the assessed value increment would go far to reduce the rivalry for tax base and permit other kinds of development criteria, including environmental criteria, to carry more weight.

Establish a Fiscal Cost/Revenue Balance as a Condition of Development Approval

The citizens and officials of a community often make decisions on development proposals without knowing if the revenues generated by the development are in balance with the costs required to provide municipal services. When costs are significantly and consistently out of balance, inefficient development patterns usually result. The establishment of policies will require the development of methods of determining fiscal costs and revenues to a municipality. The DRCOG could provide assistance in developing such policies and methods which must recognize that other economic and social considerations may override the goal of balanced costs and revenues.

Accelerate Development of Parks and Recreation Sites

The forecasted decrease in the per capita recreation area within the region and the associated adverse impacts can be mitigated if local agencies developed and implemented plans to acquire and develop recreational and park sites in the Denver region. The aggregate amount of land that needs to be developed is about 400 acres a year for the next several years to maintain existing park density.

Discourage Growth in the North and Northeastern Portions of the Denver Region

About 75 percent of the agricultural land, including 85 percent of prime agricultural land, forecast to be lost to urbanization by the year 2000 is located in Adams, Arapahoe, and Boulder counties. Over half the prime agricultural land expected to be lost is located in Adams county. By not providing grant funds for capacity expansions of wastewater treatment facilities in Adams County and the plains portion of Boulder county, growth may be slowed in these areas and redirected to other areas of the Denver region. Growth is supported by other urban services, as well as by wastewater collection and treatment. Therefore, the effectiveness of this mitigating measure will be limited unless supported by coordinated federal, state, and local government policies.

Mitigation of Water Quality Impacts

The various strategies for control of point and non-point sources of water pollutants which were evaluated in the EIS will not result in water quality which will meet 1983 goals of "fishable, swimmable" waters. Thus, it is necessary to consider additional measures which may be taken.

Although future water quality will be influenced primarily by non-point sources, phosphates are an exception, point source control is necessary to achieve water quality goals during low flow periods and downstream from the Metro discharge to the South Platte. It is also possible that the water quality goals themselves are unrealistic or inappropriate for the Denver Region. Within these contexts, the following mitigation measures are evaluated.

Revise Water Quality Goals

The present water quality goals for most of the streams in the region were established to permit water contact recreation, warm water fishery, good aesthetics (appearance and odor), animal watering, irrigation and use of stream waters for water supply. If goals were reduced to include a smaller range of stream uses and benefits such as non-contact water recreation, warm water fishery, aesthetics and all other uses except as a domestic water supply, the goals would still not be met year round. Further relaxation of the goals would severely limit the recreational potential of streams, a resource of increasing importance in the future, and seriously impair domestic water supplies within and downstream of the Denver region. Thus it may be possible to

reduce the degree of control necessary for point and non-point sources of pollution and related costs by revising water quality goals, but the overall advantage appears small.

Improved Wastewater Treatment

Improving the water quality of discharges from wastewater treatment plants over and above that considered in the EIS or the Clean Water Plan would further improve stream water quality during low flow periods in general. However, a very effective non-point source control program would also be necessary to meet year round water quality goals. Phosphates are the only pollutant that will be dominated by point sources in 1983. All other pollutants are dominated by non-point sources contributing to water pollution upstream of the Metro discharge. Metro discharges of BOD, phosphates, and ammonia will be the dominate source of these pollutants in the South Platte downstream of the Metro discharge point. The quality of water when discharged to streams from municipal and industrial wastewater treatment plants, which would result in substantial achievement of water quality goals in association with non-point source control would have to be BOD, 5 mg/l; suspended solids, 5 mg/l; ammonia, 1 mg/l; phosphates, 0.3 mg/l, and total nitrogen, 2 mg/l. When discharges were not to streams, as for urban and agricultural irrigation, discharge quality should be BOD, 20 mg/l, suspended solids, 20 mg/l, ammonia, 3 mg/l; phosphates, 8 mg/l; total nitrogen, 5 mg/l, and TDS, 500 mg/l.

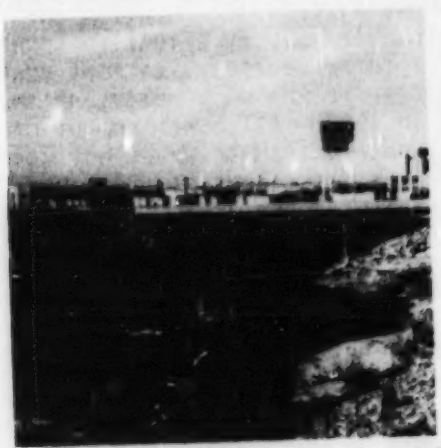
Non-Point Source Control

It has been estimated that in conjunction with high levels of point source treatment, a 75 percent reduction in non-point sources will be necessary in the South Platte basin and 60% in the South Boulder and Coal Creek basins to meet water quality goals. There are two basic approaches to non-point source control; structural and non-structural. Structural control involves the collection, storage, and treatment of urban runoff waters. Non-structural control involves such programs as more frequent and effective street sweeping, control of agricultural and domestic animal waste, greater litter controls, maintenance and cleaning of street catch basins, etc. The Clean Water Plan recommends a non-structural approach which if implemented effectively and uniformly, is estimated to reduce non-point sources of pollutants by 30 percent. A structural approach was not recommended because of high cost and doubtful

effectiveness. As a consequence, an expanded water quality monitoring program was proposed to more specifically identify non-point sources which in turn would permit the formulation of tailored and effective control measures.

Development and Growth Controls

Future water quality problems in the majority of the Denver region will be dominated by non-point sources of pollution even if the non-structural control program recommended in the draft Clean Water Plan were implemented and effective. Future structural controls are likely to be limited to commercial and industrial areas of the region as there is significant evidence that the majority of a number of non-point sources of pollution originate from these areas. An additional category of mitigating measures not considered in the draft Clean Water Plan is limitation of the amount, type, or location of future growth.



The upstream portions of the South Platte and its tributaries beyond the urban fringe have significantly better water quality, and have the greatest potential for achieving water quality goals. Protection of these upstream areas can be achieved by stringent development controls which would:

1. Prohibit floodplain development and/or require a 200 foot stream setback.

2. Minimize impervious areas and vehicle areas and vehicle use.

3. Provide for the collection and temporary storage of initial or low volume runoff from commercial and industrial sites for eventual discharge and treatment by wastewater treatment plants during off peak hours.

4. Ban the use of septic tank leach fields.

5. Institute other non-structural controls as described in the draft Clean Water Plan.

Agricultural Reuse and Return Flows

The use of treated wastewater for agricultural irrigation is generally restricted in this country. This is because of possible health effects on both farm workers and the consuming public, and because of possible damage to agricultural soils. At the same time, the effects of agricultural return flows, classed as point sources, on stream water quality have not been investigated principally because no data on return flow water quality is available. As point and non-point controls are instituted, and agricultural reuse becomes more common, the importance of agricultural irrigation return flows will probably increase. Because of potential health, soil, and stream water quality impacts, the following measure should mitigate or control these impacts.

1. Establish irrigation water quality criteria necessary to protect the public health and the agricultural soils of the region.

2. Determine the current water quality of agricultural return flows and establish discharge requirements if necessary.

Regional Monitoring System

Although water quality monitoring is not a mitigative measure, per se, the 208 plan recognizes the importance of having an adequate data base from which to require the implementation of specific point and non-point control. Consequently, DRCOG has proposed a regionwide sampling network which consists of 30 sampling sites. Of these stations, 18 would be located so as to better define non-point source problems in the 208 study area. Presumably, once the relationship between man's activities and the resultant non-point source pollution is better quantitied, mitigation of non-point source pollution will be instituted where effective and economically feasible.

Mitigation of Air Quality Impacts

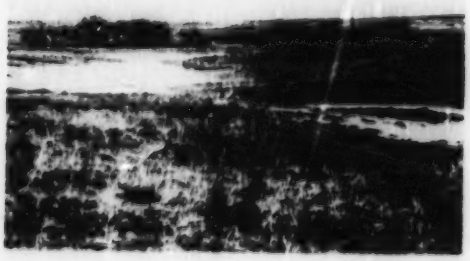
The following discussions explain the implications of certain changes in the stated assumptions which were used to predict the probable air quality impacts. The results of these changes on air quality forecasts can be used to make certain inferences about the mitigation potential of future land use, population, vehicle usage, and emission control strategies. Therefore, the investigation of the assumptions made regarding land use, transportation, etc., provides information on the sensitivity of the air quality modeling results to these assumptions, and the potential for changes in re-

gional development and transportation plans and implementation of pollution control strategies to improve Denver's air quality.

Mitigation of Growth-Related Air Pollution Emissions Through Land Use Control of Development Patterns

To aid EPA's decisions on requests to fund construction of additional capacity in wastewater facilities, it is important to know not only the consistency of regional development plans with air quality goals, but also the potential for reducing air pollution through future land use modifications. Therefore, an analysis was undertaken to ascertain the potential for changes in pollutant concentration and distribution which could be expected if the population growth patterns in the Denver Metropolitan area were to be changed.

Outlying areas which were considered to be subject to relatively high growth rates were divided into six areas, each with comparably equal projected population growth. These areas were named: 1) Broomfield/Westminster/Arvada; 2) Northglenn/Thornton; 3) Aurora; 4) South Metro; 5) Urban Jefferson County and 6), Lakewood. To simulate the air quality impact of a redistribution of population in different parts of the Denver region, several computer runs were made in each of which the year 2000 emission rates in one selected area was reduced by 25 percent, with this deficit in emissions redistributed to all other areas in proportion to their populations. Also a computer run was made in which the emissions within the Denver city limits were reduced by 17 percent and likewise redistributed to other growth areas. These perturbations were intended to represent larger, more isolated changes than might likely occur in the normal course of events, but at the same time recognize the existing urban form in Denver. This analysis was performed for each regulated pollutant.



The results of this analysis indicate that region-wide control of pollutant concentrations is not achieved by a substantial redistribution of emissions. For particulates and probably CO, emission redistribution results in local reductions in concentration equal to some fraction of the local emission reduction. Thus, it would not appear to be fruitful to utilize, restrictive, local land use controls, which might promote development elsewhere, in order to relieve re-

gional air pollution problems. Rather, it appears that for ozone an overall reduction in emissions is needed and for carbon monoxide a composite emissions reduction in many local "hot spot" locations (i.e., major arterials, freeways, and intersections) should be pursued in land use and transportation planning.

Mitigation Through a Region-wide Reduction in Emissions

Air quality impacts were forecasted from current plans and projections of growth and transportation networks. Future decisions at the federal, state, regional, or local level may change these growth projections in a way that reduces the air quality impacts by reducing the amount of pollutants emitted in the future. The effect of such changes on future air quality can be simulated to some degree by simply assuming an across-the-board reduction in pollutant emissions.

This type of simulation was performed to determine the effect of a uniform 30% reduction in emissions, on ozone formation. Such a reduction, regionwide is considered to be very significant, if attainable, and requires the implementation of all possible strategies such as parking controls and exclusive bus and car pool lanes, gasoline rationing, etc., to reduce vehicle miles of travel. It was found that a 30% uniform reduction in 1976 emissions resulted in approximately a 15% reduction in peak ozone concentrations in the region. Such a reduction in ozone concentrations would not result in immediate attainment of the ambient air quality standard. However, the ozone standard might be attained in about 20 years.

Probable Effects of an Automobile Inspection and Maintenance Program

A motor vehicle inspection and maintenance program will not eliminate the pollution problem in the Denver area, but it is a necessary first step in attacking one of its major sources. If passed, the proposed legislation will require, beginning January 1, 1979, the annual inspection and necessary maintenance of 1977 and later model year motor vehicles to help insure that their air pollution control systems work as designed. It is proposed that the inspection and maintenance program would work in much the same way as Colorado's safety inspection program. It is estimated that an inspection will cost around $5.20. When needed, maintenance may cost from twenty-five to fifty dollars. The program will not only reduce air pollution but will also result in gasoline savings through more efficient engine performance.

The exact impact on air quality of the proposed inspection and maintenance program has not been determined. In the Environmental Impact Statement, the air quality impacts are discussed assuming the inspection and maintenance program is not put into effect, which is the present situation. In contrast to the air quality predictions given in the EIS, estimates of the air quality in Denver have been made assuming very strict compliance of automobiles with the Federally mandated auto emission limitations. In fact, strict compliance is not being achieved today and is not projected to even nearly being achieved in the future without some kind of inspection and maintenance program. This is due to the fact that: 1) manufacturers are presently not able to produce cars which meet all of the emission limitations; 2) a certain percentage of cars experience early failure of the catalytic converter (the principal emissions control device) and; 3) many automobiles are not properly maintained to meet the emission limitations and others are maladjusted. An inspection and maintenance program will greatly reduce the latter two problems in meeting the Federal emission standards.

Although not exactly the result of implementing an inspection and maintenance program, strict compliance with Federal emission standards would reduce carbon monoxide concentrations by almost 40 percent of that projected for 1985 in the EIS. Regionally, although not in all "hot spot" locations, adherence to auto emission standards would bring CO concentrations very close to the 8-hour ambient standard in 1985. For ozone the effects of properly controlled automobile hydrocarbon emissions would not be as great as for CO. Peak ozone concentrations would be reduced from 15 pphm to 13 pphm in 1985, a 13 percent reduction; and from 11 pphm to 9 pphm in 2000, an 8% reduction.

Control of Particulates

According to the 1974 Denver Emissions Inventory, street sanding and the resultant dust generation from automobile traffic is the major source of particulates in the Denver region. Also, street sanding and use of salts is a significant non-point source of water pollution in the region. Therefore, a program to mitigate the impact of this source of particulate air pollution will also have water quality benefits and vice versa.

Most controls for dust generated from paved streets are concerned with reducing the amount of material on the street surface. Several studies carried out in cities other than Denver evaluated three different methods of street cleaning. These were mechanical broom sweepers, vacuum sweeners, and flushers. None of these conventional street cleaning methods were found to be effective in all areas studies. Rather, the results are mixed. In some cases signifacant reductions in particulate concentration in air were found, in others there was no measurable change. The relationship between cleaning and emissions is complex in that emission rates are not directly related to the loadings removed from the street nor closely related to the street surface loadings.

Because of these limited and mixed results, definite conclusions cannot be drawn as to the effectiveness of street cleaning as a control strategy for particulates. Demonstration studies in the Denver area would provide the best mechanism to determine the potential effectiveness of this street cleaning strategy in improving both air and water quality.

Although the relationship of street surface materials to particulate concentration in the air is complex, it appears ambient concentrations are directly releated to traffic volumes. Therefore, reductions in traffic volumes may present the most effective method of reducing the particulate air quality problem. Beyond controls which reduce automobile tail pipe emissions, reductions in vehicle use and miles travelled also appear to be the most effective measure for controlling carbon monoxide and ozone pollution. Therefore, Denver's air quality problem for all pollutants which are in violation of the National Ambient Air Quality Standards is and will continue to be highly related to the degree of dependence upon the automobile for transportation.

Mitigation of Agricultural Impacts

Mitigating measures presented to mitigate growth and other impacts, particularly for soil erosion, are pertinent to the mitigation of agricultural impacts. The following measures are presented in addition to those mitigating measures.

Water Conservation

Conservation of available water supplies can be effective in reducing competition for available supplies. Conservation efforts

in the domestic and industrial use of water can reduce demand 20-30 percent from current levels. This would greatly relieve pressures to convert agricultural water rights to municipal uses. Conservation efforts in three broad areas would be effective:

1. Continuing public education programs on the need and ways of conserving water.

2. Metering of all water users so that excessive use can be determined and water conservation measures enforced.

3. Establish water use goals with a regressive rate structure for excessive use.

4. Ban the sale and installation of water using appliances that use excessive amounts of water, e.g., ban the sale of flush toilets with tank capacity greater than three gallons.

Change Water Laws

It would seem effective to amend Colorado Water Rights Laws to require that municipalities meet certain requirements and demonstrate they have exhausted all available alternative remedies to their water supply problems. These remedies to include water reuse and/or exchange agreements, water conservation, land use planning, and development controls. This is more stringent than HB 1555 enacted by Colorado in 1975.

Agricultural Land Transfer Tax

Various proposals and state laws in the United States addressed the problem of agricultural land preservation. One proposal which appears to offer an effective mechanism is an agricultural land transfer tax. This basically involves a tax that would be levied when title or zoning is changed for some use other than agriculture. This tax would be payable by the buyer and/or individual requesting a change in zoning classification.

Mitigation of Energy Impacts

Natural Gas Shortfalls and Their Effects on Urban and Rural Users

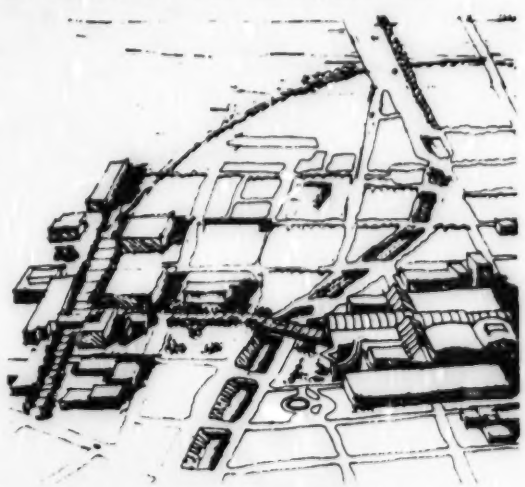
Because the Denver region has nearly 60 percent of Colorado's population, its market demand and political influence could affect the equitable distribution of the state's natural gas when supply shortfalls begin. State and federal energy allocation planning will be needed to assure that uses outside the region receive their fair share of available supplies. Also, within the region, planning will be needed to deal with supply and demand problems of electrical energy to minimize brown-outs or load reductions and shedding.

Secondary Impacts of Natural Gas Shortages on Electrical Power Generation

A major consideration of any statewide energy planning is that coal will be the primary fuel used for the generation of electric power because of the general unacceptability of nuclear power at this time. Coal mining and processing activities and coal fueled generating plants require large amounts of water. Energy planning must consider the resolution of water use allocation problems that will occur in the near future due to coal production and use.

Regional Energy Conservation

Energy conservation is a basic strategy that can be very effective. In fact, conservation is an essential element of the President's energy policies. Conservation efforts to reduce the Denver region's demand for natural gas can be implemented immediately based upon available technology. That technology is building insulation. Installation of insulation in existing commercial, residential, and industrial buildings and the requirement that future buildings be insulated could potentially reduce the demand for natural gas by as much as 10 percent in 1980 and 30 percent in 1990. In addition, insulated buildings would enhance the feasibility of solar heating and cooling.



There are many effective energy conservation measures, some of which are or will be inacted by Congress. Vehicle fuel efficiency standards and building insulation standards are examples. However, initiatives by state, regional, and local government will be required as well.

Energy Use in Wastewater Treatment Plants

Expansion of existing wastewater treatment plants and new plants should be planned and designed to minimize energy consumption. Use of insulation, solar power, methane generated by some treatment processes, and careful process and hydraulic design would substantially reduce energy requirements particularly for new plants. In addition, back-up power generating equipment and fuel supply storage should be installed in existing and new facilities in anticipation of natural gas and electrical power cut backs.

MAJOR UNAVOIDABLE ADVERSE IMPACTS

1. The region will continue to grow in both population and urbanized areas at the expense of existing and potential agricultural areas. The existing, complex framework of government agencies will hinder the solutions of region-wide problems.

2. Urban sprawl is expected to continue with the migration of the affluent and advantaged to the suburbs. Out-migrants from the urban core will be replaced in large measure by the poor, the old, minorities, and the disadvantaged. Economic growth in the suburbs will be more rapid than in the urban core. Physical and economic decay of the urban core is expected.

3. Damage to park and recreational facilities resulting from overuse or vandalism will continue and intensify as park acreage per capita ratio decrease.

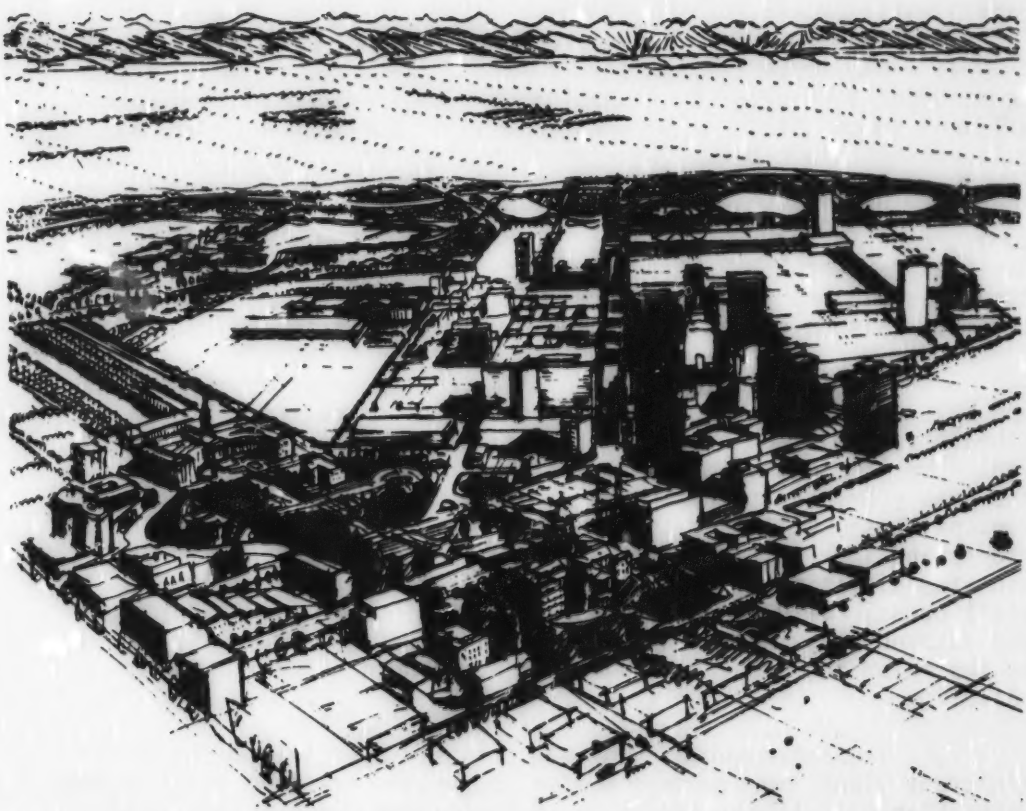
4. Public health and soil damage impacts may occur as a consequence of agricultural irrigation with wastewater treatment plant effluent unless State of Colorado and local public health and agricultural officials establish effective effluent quality standards.

5. Particulate air pollution concentrations can be expected to increase in future years resulting in continued violation of the National Ambient Air Quality Standards. The major sources for particulates will continue to be related to construction activities, and materials on streets thrown up by vehicular traffic.

6. With the implementation of a vehicle emission inspection and maintenance program, carbon monoxide concentrations on a regional scale will be near to but still exceed standards in 1985. Peak ozone concentrations will continue to violate standards for the same year. By the year 2000, carbon monoxide on an average regional basis will meet standards, but high volume traffic corridors and intersections will continue to have "hot spot" carbon monoxide violations. Peak ozone concentrations will be near, but still occasionally exceed standards. The high per capita usage of the automobile by residents of the Denver region will continue to be the major source of carbon monoxide, ozone and particulates pollution.

7. The implementation of all proposed municipal wastewater treatment plant improvements and/or the recommendations of the Clean Water Plan will likely result in an improvement in existing stream quality, but not in a degree sufficient to meet 1983 goals.

8. The region will experience natural gas supply shortfalls by 1978-1979. Increased dependence on coal for electrical power generation will create new water allocation and quality problems.



SIGNIFICANT ISSUES TO BE RESOLVED

Water quality goals will not be met by any of the proposed alternatives, singly or in combination with the recommendation of the Denver Clean Water Plan (208 Plan). Even though DRCOG worked with over sixty agencies in developing the plan, there is no assurance that the 208 Plan recommendations will be carried out, given the complex institutional setting of the Denver region. Without such assurance, the long-term value of EPA investments in the treatment level and capacity of municipal wastewater treatment plants in the region is open to question.

Actions of other federal agencies may minimize the effectiveness of EPA, state and local actions to improve water quality and mitigate adverse environmental impacts resulting from the continuation of historic forms and patterns of urban growth. Such patterns result in adverse environmental impacts regarding, air quality, loss of prime agricultural land and competition for available water and energy resources. The mechanism for effective coordinated federal action by all agencies has yet to be developed and remains at issue.

As discussed throughout this document, air quality is forecasted to improve over the next two decades, with the exception of particulates. However, standards for CO and ozone will continue to be exceeded over much of this period. No air quality projection has been made for Denver beyond the year 2,000, and the impact of pollutant emissions in Denver on downwind residents is also yet to be determined. This situation of continued air quality problems will continue to impact the health of the Denver region populace. While the major source of the problem has been identified as the automobile, present projections indicate increased vehicle usage in the Denver region. Federally required emission controls and the possibility of an emissions inspection and maintenance program are expected to be the principal strategies for reducing pollutant concentrations. For particulates, vehicle emission controls will not impact future concentrations and the present problem is expected to get worse.

Following are some of the remaining significant issues concerned with air quality downwind of the Denver Region.

(1) Air quality forecasts were limited to the Denver region. Air quality 50 to 150 miles downwind of the Denver region may not improve.

(2) The increase in particulates may cause small but significant climatological changes downwind from Denver.

(3) Increase use of coal as fuel for stationary sources and as a replacement for oil and natural gas may result in higher levels of pollutants, particularly sulfates and particulates.

These considerations raise issues yet to be resolved about future air quality downwind of the Denver region.

In the context of the proposed wastewater facility funding being considered here, there appears to be no clear cut approach for EPA to address this air quality problem other than deciding not to fund proposed treatment facilities. However, this approach is not expected to significantly change the future situation either in terms of air or water quality and would only limit Federal participation in the future. What is needed is a commitment by individuals and private and public institutions to reduce dependance upon the automobile. Potential gasoline shortages and higher prices may eventually induce this change in life style without a prior commitment to significant air quality improvement.

Implementation of many of the mitigation measures discussed earlier will be a difficult task at best, due to the multi-jurisdictional problems that exist within the Denver metropolitan area. In funding wastewater treatment systems, many times EPA works directly with special Sanitation Districts who serve, but are not tied directly to municipal governments. In these cases this relationship restricts EPA's ability to negotiate special conditions which might mitigate certain specific adverse land use impacts. Additionally, there is no regional authority presently responsible for control of non-point pollution from urban runoff. Therefore, the present improvement of water quality, through control of both point and non-point pollution sources, is effectively limited by the lack of a non-point source management agency. These jurisdictional and management difficulties are not limited to water pollution control but also include areas of water supply, flood control, recreation, regional development, transportation, air quality, agriculture, and others involving the region's social welfare. Consolidation of responsibility or other measures to develop regional responsibility and authority, such as discussed under the section on Mitigation Measures, appears to be the most effective means to gain more effective implementation of worthy environmental mitigation measures.